THE ONTARIO WATER RESOURCES COMMISSION

REPORT ON

INDUSTRIAL WASTE SURVEY

CITY OF GALT

1961

I N D U S T R I A L W A S T E S U R V E Y

C I T Y O F G A L T

DURING

AUGUST AND SEPTEMBER, 1961

A report on the investigation of waste waters discharged by industries in the city of Galt to the municipal sewers and natural watercourses.

by

D. P. CAPLICE and H. E. ROBERTS

Industrial Waste Branch

Ontario Water Resources Commission

TABLE OF CONTENTS

Table of Contents (continued)

ONTARIO WATER RESOURCES COMMISSION

Municipality Galt Date of Inspection August and September 1961

Re: Disposal of Industrial Wastes in the city of Galt

Field Inspection by: D. P. Caplice and H. E. Roberts Report by D.P. Caplice and H.E. Roberts

INTRODUCTION

A survey of the disposal of industrial wastes was made in the city of Galt in August and September, 1961, to determine the amount and nature of wastes being discharged to the city sewerage system from industrial sources, and to indicate pretreatment or control measures that might be undertaken to facilitate operation of the secondary sewage treatment facilities now under construction.

Forty-one industries that were known to discharge process wastes to the municipal sewers, or to use large quantities of process water, were visited to obtain processing and operating data. Of these, eleven were considered to contribute significantly or were potential contributors to sewage treatment plant loading, and are discussed in this report. The data on eighteen others which discharge relatively clean water are tabulated and a brief discussion of the possible overall effects of these industries on operation of the new plant is included.

SEWAGE TREATMENT

All sanitary sewage in Galt is collected in a separate sewer

Sewage Treatment (continued)

system, and is carried to the primary treatment plant located on the east side of the Grand River at the south boundary of the city. Treatment consists of primary settling and sludge digestion. Digested sludge is hauled to field disposal by a contractor.

The design capacity of the plant is 3.0 MGD, with the current average daily flow estimated to be in excess of 4 MGD. Peak flows in excess of 5 MGD reach the plant during run-off from storms, and it appears that a considerable storm flow reaches the sanitary sewerage system, particularly in the older sections of the city where catch basins and roof water downpipes are connected to the sanitary sewers. Also, it is known that in a number of sections the storm sewers are located in the sanitary sewer trench and share common manholes with the sanitary sewer. At these locations the storm sewer pipe is at a higher elevation than the sanitary sewer, with the top section of the pipe cut out, thereby allowing overflow from the storm sewer to discharge to the sanitary sewer, or vice versa. In a consulting engineer's report of 1956, titled "Sewage Treatment for the City of Galt", it was reported that the amount of water consumed by the city for a twelve month period was approximately 650 million gallons, while the recorded sewage flow was approximately 970 million gallons. This discrepancy was attributed to infiltration which no doubt was the prime contributor, but the use of private water supplies by industry, with discharge after use to the sewer system is also a contributing factor.

From the above considerations, one would expect the raw sewage

Sewage Treatment (continued)

strength to be somewhat lower than usually encountered at municipal sewage treatment plants. This is borne out by the results of analysis of seven recently submitted monthly composite samples, which show an average BOD of 124 parts per million in the influent to the primary plant.

CONDUCT OF SURVEY

The information compiled in this survey was obtained principally by consultation with industrial management, and by the collection and analysis of waste samples from those industries from which waste discharges appeared important. Brief examination of the industrial processes and waste disposal practices, together with the results of analysis of waste samples, formed the basis for determining the need for modifying present industrial discharges.

Initial undertakings in the survey were facilitated by the use of a list of process industries that was made available by the Galt Board of Trade, and by the provision of industrial water consumption data by the Public Utilities Commission.

All waste samples taken during the survey were returned to the Ontario Water Resources Commission Laboratory in Toronto for analysis in accordance with procedures described in "Standard Methods for the Examination of Water and Wastewater", Eleventh Edition.

SUMMARY

A study of the disposal of industrial wastes to the sewerage system of Galt indicates that the principal sources of wastes that either contribute significantly to the day-to-day sewage plant loading or give rise to fluctuations in waste loading that may interfere with secondary treatment processes are:

(a) Textile plants where Biochemical Oxygen Demand (BOD), pH and colour are of primary importance, with the need for control of suspended solids indicated in certain cases.

(b) Metal-working and plating plants with acidic or alkaline cleaning or plating solutions, and the rinse waters associated with them. Toxic ions in plating solutions, oils and greases, etc., all can exert effects which can be detrimental to the proper treatment of sanitary sewage.

(c) Dairies and creameries - The principal effect on sewage treatment is the high oxygen demand exhibited by certain wastes from these operations. Generally speaking they only present a problem when spillage or dumping of whole milk or mill products is not rigidly controlled. Good housekeeping practices, when closely adhered to, can usually control the BOD loading satisfactorily.

The specific effects of industrial wastes on the sewerage system of Galt can be summarized as follows:

<u>Physical Effects</u> -

1. <u>Volume</u> - In the disposal of industrial wastes to municipal

Summary (continued)

sewers, this waste characteristic is of major importance, as the dilution obtained in the sewers will become less as the waste volume increases. As it is not likely that all the industries will operate simultaneously at maximum capacity, the total industrial hydraulic loading of just over 1.2 million gallons per day will be less than this maximum shown in the following water consumption data of Table II.

The present municipal sewage treatment plant just has adequate capacity to handle the quantity of sanitary and industrial wastes now being sewered, but, because of heavy infiltration into the sewers, it has been operating at or beyond capacity. The design capacity of the new plant will more than handle this load.

The industrial waste loading represents about 38 percent of the total municipal loading, based on water supply, but it only represents 30 percent of the actual flow reaching the sewage treatment plant because of the added flow from infiltration. Just under half of this hydraulic load is contributed by the industries (summarized in Table IV) which use large volumes of water for cooling.

2. Temperature - The operations carried out in the textile industries result in abnormally hot waters being discharged to the municipal sewers. These hot wastes can accelerate corrosion, lead to thermal stresses, adversely affect the jointing material and cause more rapid decomposition of organic matter leading to development of septic conditions. Hot wastes, if they reach the sewage treatment plant can also interfere with primary

Summary (continued)

settling. In Galt this situation is not likely to exist as the dilution in the sewers during the day is quite high.

3. Suspended Solids - It appears that the control of suspended solids from industrial sources will not present a problem in the operation of the new sewage treatment plant in Galt. Suspended solids concentrations recorded in this survey are, for the most part, below the maximum recommended limit of 350 parts per million for discharge to a sanitary sewer. Exceptions occur where batch dumping of strong process or cleaning solutions takes place. Where feasible, control of such wastes by land dumping or incineration should be practised.

4. Coarse and Floating Solids, Oils and Grease - Coarse and floating solids are easily determined in an industrial waste discharging to sewers by screening or visual observation and should be strictly prohibited since they (i) are easily separated, and (ii) may cause obstruction of the flow in the sewers and damage pumps or other equipment at the treatment works.

The disposal of waste mineral oils and greases to the sewer system should be closely controlled due to the treatment problems encountered in their removal, because of their flammability and potential explosiveness, and because they may decrease the aeration capacity of the treatment plant.

Chemical Effects -

1. pH - The disposal of batches of strong cleaning solutions from metal working plants and dumps of batch process liquors from the textile

Summary (continued)

plants may adversely affect the operation of the new sewage treatment plant, and are harmful in the sewer system because of their corrosive attack on metals, concrete and materials of construction. The alkaline wastes of the textile industry do not have the corrosive characteristics of acid wastes, but they have objectionable effects in that they dissolve or disperse organic materials that might otherwise settle out in the water. The resulting solutions, or colloids, result in increased organic concentration and suspended solids being discharged in the final sewage treatment plant effluent.

2. Colour - Colour in industrial wastes discharged to public sewers is not an objectionable characteristic as longas the dilution in the sewers and the treatment processes employed can adequately remove it before the final effluent reaches the stream. The wastes from dyeing operations carried out in the textile industries in Galt may be a problem in this regard and if so, equalization facilities with controlled discharge will be necessary at these industries.

The activated sludge process, which will be used to treat the sewage at the new plant is capable of treating combinations of sewage and textile wastes. This method is known to provide the best colour removal when efficiently operated. The volume of sewage in Galt is large, and with control of waste discharges, no trouble should be experienced in removing colour from the combined sewage and industrial wastes.

The amount of dilution required to completely dispel the colour

Summary (continued)

of some of the wastes was determined in the laboratory to estimate the persistence of the colour. This test assumes that raw sewage has similar diluting capacity to distilled water.

Synthetic Detergents -

The textile industries discharging to the public sewers in Galt use a wide variety of synthetic detergents commonly called syndets. Their control presents problems since they vary greatly in their biochemical behaviour depending upon their chemical structure. The alkyl benzene sulfonates (ABS) derived from propylene are resistant to biological attack and hence the 5-day BOD test on the raw sewage may not indicate the strength of the waste being discharged.

Biological Criteria -

1. Biochemical Oxygen Demand (BOD) - The BOD is a measurement of oxygen required for the aerobic bacterial stabilization of the decomposable organic matter in waste. This analysis serves as a yardstick for measuring, or predicting, the effects of wastes on a sewage treatment plant or on a receiving stream. The 5-day figure at 20^{o}C. is generally used and it must be emphasized that only part of the oxidizable matter is decomposed in this time. The carbonaceous matter is preferentially oxidized, and, in general, the oxidation of ammonia to nitrite and nitrate compounds takes place at a later stage . Under the 5-day restriction for a readily oxidized organic waste, about 68 percent of the ultimate oxygen demand is realized.

Summary (continued)

The BOD of normal untreated sanitary sewage is generally between 200 and 300 parts per million, and the effluent from a modern, efficient secondary sewage treatment plant about 15 parts per million or less. A part of the BOD of sewage is due to suspended solids that are removed by primary sedimentation and the remainder due to the finely divided, unsettled solids and the dissolved organic solids that must be subjected to secondary (biological) stages. Many industrial wastes, such as those from textile plants, dairies and metal finishing plants, consist largely of dissolved substances only, so that their effect is mainly on the secondary stage of sewage treatment.

Toxicity -

Almost every metal can be found in sewage which is made up in part of industrial wastes. The most troublesome discharges of toxic inorganic and metallic ions originate from the plating and metal-finishing industries whose wastes contain variable concentrations of cyanide, chromium, nickel, copper, and zinc. The problem in regard to control to protect secondary treatment processes arises in calculating from a discharge the concentration which will reach this stage of the process, because chemical change occurs as well as possible precipitation and occlusion in sludge in the primary system.

The degree of acclimatization of a biological treatment process to a sustained concentration of specific ions is a factor when one considers discharges of toxic wastes to sewers. If an environment that favours the

Summary (continued)

desired growth of organisms in a treatment process is established, any rapid or extreme change in this environment will upset the required biological balance, resulting in an interruption of the treatment process which may last for several days or weeks.

RECOMMENDED MAXIMUM LIMITS FOR DISCHARGE OF INDUSTRIAL WASTES TO PUBLIC SANITARY SEWERS

Temperature	- not to exceed 150°F
Suspended Solids	- 350 parts per million
Oils and Greases	- (a) animal or vegetable origin - 100 parts per million (b) mineral origin - 10 parts per million
pH	- less than 5.5 greater than 9.5
Biochemical Oxygen Demand	- 300 parts per million
Toxic Substances -	
Chromium as Cr (hexa)	- 3 parts per million
Cyanide as HCN	- 2 parts per million
Phenol or equivalent	- 50 parts per billion
Copper as Cu	- 1 part per million

* S.P.E.: 100 gallons/cap/day
0.167 lbs.BOD/cap/day
0.2 lbs S.S./cap/day

TABLE I
SUMMARY OF INDUSTRIAL WASTES

Name of Industry	Type of Industry or Product	Number of Employees	Water Consumption (gallons per day)		* Maximum sewered Population Equivalent			Remarks
			Industrial	Sanitary	Flow	BOD	S.S.	
Fromm Brothers Limited	Woollen and worsted fabrics	80	10,400	1,600	104	720	75	Controlled discharge of all wastes should be considered.
Stauffer-Dobbie Limited Water Street North	Terry towels, bed spreads	400	72,000	8,000	720	1,600	1,440	Waste holding facilities to prevent "slugs" of strong wastes from reaching sewers should be considered.
Dobbie-Industries Ainslie Street - formerly Newlands-Harding Yarns	Woollen yarns, Woven fabrics, Knitted fabrics	800	282,000	18,000	2,820	3,664	3,270	Provision of an equalizing tank larger than the sump to collect and blend all wastes should be considered.
Franklin Manufacturing Company Limited	Freezers and refrigerators	250	170,000	20,000	1,700	1,300	1,730	Hydraulic effect and chromium content of batch discharges need revision to facilitate STP operation.
Galt Dairy	Bottling works	13	14,700	260	147	45	22	Batch dumping of whole or skim milk should never be permitted
Dixon Dairy Products	General dairy	25	41,500	500	415	160	80	Batch dumping of whole or skim milk should never be permitted.
Valley View Creamery	Creamery	9	37,800	180	378	336	168	Batch dumping of whole or skim milk should never be permitted.
Cedar Hill Dairy	Bottling works	25	32,000	500	320	78	39	Batch dumping of whole of skim milk should never be permitted.

TABLE II

INDUSTRIAL WASTE LOADINGS

Name	Flow: Imperial gpd	Flow: Percent of Total	5-day BOD: Pounds per day	5-day BOD: Percent of Total
Fromm Brothers Limited	10,400	0.8	120	9.1
Stauffer-Dobbie Limited	72,000	6	268	20
Dobbie Industries Ainslie Street plant	282,000	23	610	46.5
Franklin Manufacturing Company (Canada) Ltd.	190,000	16	219	16.5
Galt Dairy	14,700	1.2	7.5	0.7
Dixon Dairy Products	41,500	3.4	26.5	2
Valley View Creamery	37,800	3	56	4.2
Cedar Hill Dairy	32,000	2.6	13	1.0
The 19 Industries of Table IV	546,000	44		
T O T A L	1,226,400		1,320	
Six Metal Finishing Industries of Table III	194,000			

TABLE III

Concentrations of Toxic Components in Industrial Wastes from Six Metal Finishing Industries - in parts per million.

Name	Point of Discharge	Chromium Total	Chromium Hex.	Copper	Zinc	Cyanide	Nickel
Royal Metal Manufacturing Company Limited	Storm Sewer	4.4	3.3			0.8	
Galt Brass Company Limited	Storm Sewer	10.0	7.0	1.6		2.2	0
Rauscher Plating Company Limited	Grand River	0.18 0.07	0 0	1.4 1.1	0.2 2.1	3.0 15.0	0 0
Electronic Coating Limited	Grand River	6.4	6.4				0
Dominion Tack and Nail Company Limited	Leaching pits on plant property			39.0	0.1	56.0	6.8
Allen-Bradley (Canada) Limited	Pond on property	0.12	0.0	0.4		2.4	

TABLE IV

SUMMARY OF INDUSTRIES WITH LITTLE OR NO PROCESS WATER

NAME OF INDUSTRY	PRODUCT	NUMBER OF EMPLOY-EES	WATER CONSUMP-TION (GPD) PUC	PRIVATE	WATER (USAGE) WASTES (GALLONS PER DAY) SANI-TARY	COOL-ING	OTHER	DISCHARGE LOCATION	REMARKS RE OTHER SOURCES OF WASTES
BABCOCK-WILCOX GOLDIE-MCCULLOCH LIMITED	STEAM POWER PLANT EQUIPMENT	830	200,000		25,000	150,000	25,000 FOR TANK TESTING ETC.	SAN. SEWER SOME COOLING WATER TO STORM SEWER	BOILER BLOW DOWN (PERIODIC) 2 QUARTS LUB.OIL IN 500 GAL. WATER DAILY
	CENTRIFUGAL PUMPS	"	"		"	"	"	SANITARY SEWER	
BARRDAY LIMITED	INDUSTRIAL FABRICS	20	1,000		1,000			SANITARY SEWER	PERIODIC DUMP OF 1% CAUSTIC CLEANER - 50 GALLONS
CANADIAN BRASS COMPANY LIMITED	BRASS PIPE FITTINGS	90	14,000		2,000	6,000	6,000	SANITARY SEWER	90 GALLONS OF SOLUBLE OIL USED IN PLANT PER YEAR
CANADIAN GENERAL TOWER LIMITED	VINYL PLASTIC PRODUCTS	400	300,000		10,000	290,000		SANITARY SEWER ALL COOLING WATER TO GRAND RIVER	
CANADIAN MACHINERY CORPORATION LIMITED	MACHINE TOOLS WOODWORKING MACHINERY	250	81,000	SOME FROM PRIVATE WELL NO ESTIMATE AVAILABLE	6,000	75,000		SANITARY SEWER	
CANADIAN TAP AND DIE COMPANY LIMITED	TAPS AND DIES SCREW PLATES	35	42,000		1,000	40,000	1,000	SANITARY SEWER	135 GALLONS/YEAR OF WATER SOLUBLE CUTTING OILS - PERIODIC DUMP OF A CAUSTIC DEGREASING SOLUTION
CANADIAN WESTINGHOUSE STURTEVANT DIVISION	HEATING AND VENTILATING EQUIPMENT	240	30,000		6,000	24,000		SANITARY SEWER	BOILER BLOW DOWN SOME WATER USED TO TEST EQUIPMENT
CELLO PRODUCTS LIMITED	BRASS SOLDERED FITTINGS	55	5,500		1,400	4,100		SANITARY SEWER	
FIRTH-BROWN TOOLS (CANADA) LIMITED	SMALL PRECISION CUTTING TOOLS	40	23,000		1,000	20,000		SANITARY SEWER	PERIODIC DISCHARGE OF CAUSTIC SCALE REMOVER SOLUTION - SOME SOLUBLE OILS IN WATER SOFTENER BACKWASH
FISHER'S BREAD COMPANY LIMITED	BREAD, CAKES	75	13,000		2,000	1,000	10,000	SANITARY SEWER	SOME WASTE WATERS FROM EQUIPMENT WASHING

TABLE IV (CONTINUED)

NAME OF INDUSTRY	PRODUCT	NUMBER OF EMPLOYEES	WATER CONSUMPTION (GPD) PUC	PRIVATE	WATER (USAGE) WASTES (GALLONS PER DAY) SANITARY	COOLING	OTHER	DISCHARGE LOCATION	REMARKS RE OTHER SOURCES OF WASTES
GALT MALLEABLE IRON LIMITED	MALLEABLE IRON CASTINGS AND HARDWARE	200	25,000	30,000	4,000	46,000	5,000	A) SANITARY SEWER B) STORM SEWER TO MILL CREEK	A) SANITARY WASTE CAUSTIC DEGREASING SOLUTION (PERIODIC) BOILER BLOW DOWN B) COOLING WATER
GALTEX LIMITED	SYNTHETIC YARN THROWSTERS	100	21,000		2,000	15,000	4,000	SANITARY SEWER	
JOY MANUFACTURING (COMPANY LIMITED	MINING EQUIPMENT	200	13,000		4,000	9,000		SANITARY SEWER	CUTTING OILS LAND DUMPED
R. MCDOUGALL COMPANY	MACHINE TOOLS	78	9,000		1,000	8,000		SANITARY SEWER	CUTTING OILS LAND DUMPED
RIVERSIDE FABRICS LIMITED	SYNTHETIC FILAMENT YARNS	100	15,000		2,000	8,000	SELL WATER TO ELECTRONIC COATING LIMITED	SANITARY SEWER	SOFTENER BACKWASH
SHELDON'S ENGINEERING COMPANY LIMITED	HEATING, VENTILATING, AIR-CONDITIONING EQUIPMENT	225	13,000		5,000	8,000		SANITARY SEWER	CAUSTIC DEGREASING SOLUTION (PERIODIC) SOME WATER SOLUBLE CUTTING OILS
SHURLEY DIETRICH ATKINS COMPANY LIMITED	SAWS, FILES	110	33,000		2,800	28,000	1,200	SANITARY SEWER	CAUSTIC DEGREASING SOLUTION (PERIODIC DUMP) SMALL DISCHARGE OF WATER SOLUBLE CUTTING OILS
THORNWELL FOOD LIMITED	FROZEN FOODS VARIETY MEATS	35	32,000		1,000	30,000	1,000	SANITARY SEWER	SMALL DAILY DISCHARGE OF WATER FROM VATS IN WHICH HAMS ARE COOKED

CONCLUSIONS AND RECOMMENDATIONS

The textile and dairy industries in Galt (see Table I) contribute organic wastes for which the final treatment can be most practicably and economically supplied by the municipal treatment plant. Pretreatment of certain wastes before discharge to the sanitary sewer has been recommended for several of these industries, with the details contained in the individual reports. The discharge of all textile and dairy wastes to the municipal sewerage system, should continue providing they meet the recommended limits previously indicated.

With continued discharge of textile wastes, the inbalance of such wastes could conceivably present problems in operation of the new secondary facilities when all of the textile plants are considered together. The most obvious problem, removal of excessive colour in these wastes, should be adequately handled by the use of the activated sludge process at the new plant. Two others deserving consideration, are the possibility of excessive foaming in aeration tanks due to the synthetic detergent content of these wastes, and the affect of shock loads on sewage plant efficiency if one or all of the textile plants discharged a particularly large volume of strong waste over a short interval. Foaming, if a problem, will have to be controlled at the sewage disposal plant either by the use of chemicals or by built-in design considerations. Shock loads are the responsibility of industry, and can be controlled by the installation of equalization and blending facilities where required.

Seven metal finishing industries with process wastes are operating in Galt but only one, Franklin Manufacturing Company Limited, contributes

Conclusions and Recommendations (continued)

wastes to the sewerage system. Pretreatment of certain wastes from this industry has been recommended. Of the remaining six (see Table III), two discharge wastes directly to the Grand River, two to the storm sewer system, and two to seepage pits or ponds located on their respective plant properties.

The two industries discharging to the river, Rauscher Plating Company Limited, and Electronic Coating Limited, should, by the use of the simple pretreatment methods outlined to them in the reports which follow, be able to reduce the concentrations of toxic components in their wastes to levels recommended for discharge to the sewerage system. The alternative is complete treatment of these wastes prior to their discharge to the river.

For the two industries discharging to the storm sewer system, a similar approach to that outlined above is necessary, as the concentrations of toxic constituents present in the waste flows are above the desired limits for discharge to storm sewers. Often, no dilution is afforded to a waste in a storm sewer, and the discharge is, in effect, directly to the receiving waters. If Galt Brass Company Limited and Royal Manufacturing Company Limited, are desirous of continuing with discharges to storm sewers, it is required that they meet the following limits by suitable in-plant pre-treatment of plating room effluents:

Cyanides as HCN	- 0.1 part per million
Cadmium as Cd	- 1.0 part per million
Chromium as Cr	- 1.0 part per million
Copper as Cu	- 3.0 parts per million
Zinc as Zn	- 15 parts per million
Iron as Fe	- 17 parts per million
Chlorides as Cl	- 1500 parts per million
Sulphates as CO_4	- 1500 parts per million

Conclusions and Recommendations (continued)

In the case of Dominion Tack and Nail Company Limited, and Allen-Bradley (Canada) Limited, who both dispose of plating room wastes on their plant property, it is noted that neither system was completely free from defects at the time of inspection. If land disposal at both plants is to continue, effective control and maintenance of the areas under use will have to be exercised to ensure (1) that no surface flow of plant wastes away from the plant property occurs because of improper drainage, and (2) that disposal areas are properly fenced off to prevent children or animals from gaining access to the leaching pits or ponds. The alternative here is proper pre-treatment of these plating wastes with discharge to the storm or sanitary sewer system depending upon the degree of treatment.

If any or all of the above companies seek to discharge their wastes into the sewerage system, the dilution factor that such wastes will receive in the Galt sewerage system is very high as large volumes of cooling water and considerable infiltration contribute to the daily hydraulic load. Therefore, if the recommendations for pretreatment of any or all of these toxic waste flows are carried out, no problems should arise when secondary (biological) treatment facilities are completed.

In general, some or all of the following procedures have been recommended whether the industry in question is discharging to the sewers or not:

1. Drag-out (make-up) rinse tanks should be used. These are effective if

Conclusions and Recommendations (continued)

the solutions in these tanks are not allowed to become too concentrated.

2. Plating and rinse tanks should be placed "in-line" to avoid crossing of aisles with work pieces and to prevent drip of plating solutions to floors.

3. Plating and rinse tanks should be placed close together and provided with drip trays which slope towards the tanks from which work pieces are removed.

4. Work pieces should be drained thoroughly of plating solutions before transfer to rinse tanks.

5. Rinse water from acid and alkali solutions should be channelled to a common gutter before draining to any sewer.

6. Sludge bottoms from plating and rinse tanks should be disposed of by trucking to suitable disposal areas, or treated.

A major portion of the industrial water supply used in Galt (44 percent) goes to eighteen industries (see Table IV) whose prime use is in cooling of heavy machine tools, welding machines, extrusion machines, compressors, etc. Except for two industries (Galt Malleable Iron, and Canadian General Tower Limited) and a portion used by another, all such waters are discharged to the sanitary sewer system. This situation, along with the fact that considerable infiltration is known to exist in certain areas of the city, leads to a weak sewage being received at the present primary sewage treatment plant.

Conclusions and Recommendations (continued)

The recommendation that the in-plant wastes of these industries (see Table IV) be segregated with re-routing of uncontaminated flows to storm sewers is logical but difficult to implement as;

(1) The location of all sewers in Galt is not clearly known and portions of the city are served on a combined system.

(2) The industries in most cases may be desirous of maintaining the status-quo.

The impetus to carry out in-plant segregation of waste streams, and thus reduce the hydraulic load on the sewage treatment plant. must come from the municipality. The strength of the sewage as it is presently received at the primary plant may not be conducive to the establishment of a stable biological environment when secondary treatment facilities are completed and in operation.

Municipality Galt Date of Inspection August, 1961

Re: Fromm Brothers Limited

Field Inspection by D. P. Caplice Report by D. P. Caplice

Fromm Brothers Limited, a medium sized textile industry, operates a plant at 453 Dundas Street, producing woollen and worsted fabrics for the men's and women's garment trade. All wool is purchased from commercial sources.

OPERATING DATA

Personnel Interviewed - Mr. E. J. Potter, Plant Superintendent
Mr. T. Heighton, Mechanical Superintendent

Employees - 80

Operating Schedule - 9 hours per day (most departments including dye house)
5 days per week

Water Consumption - 12,000 gpd average (PUC, 1960)
12,000 gpd average (June, 1961)

Waste Disposal - All wastes, industrial as well as sanitary are discharged to the sanitary sewer on Dundas Street.

DESCRIPTION OF PLANT PROCESSES

Fabrics are weaved from synthetic and woollen yarns, after passing through the conventional textile processes such as spinning, warping, scouring, bleaching, dyeing, etc.

All of the wet processes are confined to the dye house which

Description of Plant Processes

is equipped with two Frankling-type dyers of 400 and 800 gallon capacity each capable of processing 300 to 600 pounds of yarn per day respectively. Each dyer is used for scouring, dyeing and rinsing operations which follow in sequence. Scouring and dyeing are carried out in a closed system, with the spent liquors being dropped upon completion of each operation. The yarn rinses are usually continuous operations. The major portion of dyes used are of the coal-tar variety, though some chrome dyeing is done.

SOURCES OF WASTE

All the industrial wastes from this plant are discharged from the dye house. It must be pointed out here that the industry is subject to sharp changes in production due to seasonal demands, and, accordingly, has its peak production periods during the summer months. At this time an average of 9,000 pounds of goods is processed per week.

SAMPLING

The following grab samples were taken to ascertain maximum strengths of liquors discharged to the sewers:

		Volume
1.	Scouring solution	40 ounce grab
2.	Scouring rinse (after 10 minutes)	" "
3.	Dye liquor acidified	" "
4.	Dye rinse (after 10 minutes)	" "
5.) 6.)	Dye liquors before acidification	" "

Samples were shipped to the Ontario Water Resources Commission Laboratory in Toronto for the following analyses:

Sampling (continued)

5-day Biochemical Oxygen Demand
Total, suspended and dissolved solids
pH
Alkalinity or acidity
Colour dilution ratio
Phenols

The results are listed below with the numbers corresponding to those assigned above:

Results:-

Number	5-day BOD ppm	SOLIDS - ppm Total	Susp.	Diss.	pH	Alkalinity as $CaCO_3$ ppm	Acidity as $CaCO_3$ ppm	Phenol in ppb	Colour Dilution
1	1,420	3,380	150	3,230	7.1	332	-	650	-
2	1,360	3,856	90	3,766	7.7	344	-	600	-
3	1,320	5,212	150	5,062	5.5	-	220	50	-
4	205	1,140	92	1,048	6.3	236	-	80	-
5	160	3,744	138	3,606	8.1	312	-	250	1:5000
6	1,550	5,280	152	5,128	8.5	308	-	100	1:4000

DISCUSSION OF RESULTS

The strength and characteristics of textile wastes depend to a great extent on the type of fabric, and the method of dye application. Hence, widely varying waste strengths will be observed in the flows throughout the day. The important characteristics of wastes from this plant are BOD, suspended solids, pH and colour dilution.

The major sources of BOD in this case are the process chemicals that are discharged in the spent solutions from dye house operations. The average BOD of the six grab samples is 1,000 parts per million which results

Discussion of Results (continued)

in a BOD load of 120 pounds per day, based on the average water consumption of 12,000 gpd. This figure may be considered to be slightly below the average for a mill of this capacity (9,000 pounds of cloth dyed per week). The BOD load in such mills usually approximates 200 pounds per 1,000 pounds of wool processed.

No exceptionally high concentrations of suspended solids were recorded on any of the grab samples (average for six samples 128 parts per million) but at times it is to be expected that considerable amounts of fibres will be washed loose in processing. As this material is not conducive to digestion at a sewage treatment plant, screening of plant wastes prior to discharge to the sewers is recommended.

The colour dilution factors of 1:5000 and 1:4000 obtained for the two dye bath grab samples (Number 5 and 6) indicates that, at times, "slugs" of highly coloured waste are presently reaching the sewers. This is not an objectionable characteristic so long as the dilution in the sewers and the processes employed can adequately remove it before the final effluent reaches the stream.

The pH results recorded for the samples showed no extreme values but, as this characteristic can at times present serious corrosion problems, control should be maintained so that the pH remains in the range 5.5 to 9.5.

CONCLUSIONS AND RECOMMENDATIONS

Textile wastes, as a rule, can be treated most effectively in

Conclusion and Recommendations (continued)

combination with sanitary sewage by one of the standard methods of sewage treatment. The grab samples taken during the course of this survey indicate that the various batch operations performed during a normal dye cycle will contribute surges of strong waste to the sewers. As it is desirable to have controlled discharge to ensure maximum dilution in the sewers throughout the day, and as two other dye houses contribute significant amounts of waste to the sewers in Galt, provision for short-term waste holding facilities, along with adequate screening, should be provided at Fromm Brothers Limited.

Municipality Galt Date of Inspection August, 1961

Re: Stauffer and Dobbie Limited

Field Inspection by D. P. Caplice Report by D. P. Caplice

Stauffer and Dobbie Limited, located at Water Street North, a member of the Dobbie Industries chain is a large cotton textile mill involved in the wet processing and weaving of spun cotton yarn into towels and bedspreads. The survey of this mill was directed mainly toward sampling and analyzing samples of the batch discharges of the various baths and running rinses in the mill.

OPERATING DATA

Personnel Interviewed - Mr. A. H. Morton, Plant General Manager
Mr. H. F. Levandushy, Purchasing Agent - Dobbie Industries
Mr. T. Cody, Office Staff
Mr. W. McCusker, Dye House Superintendent

Employees - 400 hourly
35 office

435 total

Operating Schedule - 9 hour shifts - 5 days per week

Water Consumption - 80,000 gpd average PUC figure 1960
+ some private for boiler use

Waste Disposal - All industrial wastes are discharged directly to the sanitary trunk sewer running along the east bank of the Grand River, parallel to the plant

PLANT PROCESSES

This plant's operations are typical of those carried out in a cotton textile mill, and may be broken down into the following processes:

1. Fabrication includes the conventional operations of carding, spinning, spooling, warping, slashing, weaving and knitting. With the exception of slashing, none of these operations contribute any waste.

In the slashing operation a sizing, usually consisting of starch and softeners, is applied to the fibres to aid in weaving. The concentration of sizing applied varies from 2 to 10 percent, depending upon the type of beam. The waste starch solution from this operation is very concentrated but low in volume.

2. Deterging operations involve desizing, scouring or kiering, bleaching and finishing. Sizing on the piece goods is removed by means of a caustic kier boil. Raw fibre must also be scoured for dyeing or bleaching to remove the impurities and make the cloth absorbent for the operations that may follow. Scouring consists of boiling in a dilute solution of caustic soda, soda ash, or other alkaline substances.

Scouring or kier liquor is the largest single waste from cotton mills and is the most harmful of all wastes produced in the processing of cloth.

The peroxide bleaching waste is similar to that produced by ordinary kiering. Such wastes are large in volume but seldom offer difficulties when combined with wastes from subsequent dyeing processes.

Plant Processes (continued)

3. Dyeing produces highly coloured wastes which, because of dye solubility, are often difficult to decolour. The dyes used in this plant are of the coal-tar variety and are mainly direct and basic types.

Two types of dyeing are carried out, namely: yarn or package dyeing, in which the dye liquor is circulated through the material, and piece dyeing, in which the cloth passes through the dye bath. Plant dyeing equipment consists of two package yarn dyers each capable of handling 600 pound batches of yarn, and five piece-dyeing machines of 1,000 gallon capacity each. Scouring and bleaching operations can be carried out in these machines as well as in the kier kettles of which there are two of 5,000 gallon capacity, and one of 2,000 gallons.

The sources of waste flows from operations in this plant may be summarized as follows:

(a) Slashing operation - the sizing waste (small in volume)
(b) Kiering and bleaching operation on piece goods
(c) Dyeing and rinsing operations on both package yarn and piece goods

SAMPLING

The following grab samples of running rinses and dump discharges were obtained:

		Volume of Sample
1.	sizing solution	40 ounce
2.	package yarn dyer - bleaching solution	"
3.	package yarn dyer - spent dye liquor	"
4.	package yarn dyer - rinse water after 10 minutes	"
5.	package yarn dyer	"
6.	kiering or scouring waste - 4 hours before discharge	"

Sampling (continued)

All samples were returned to the Ontario Water Resources Commission Toronto Laboratory for analyses. Laboratory determinations carried out included:

Biochemical Oxygen Demand (BOD)
Solids - total, suspended and dissolved
pH
Alkalinity or Acidity
Phenol

In addition the amount of dilution required to completely dispel the colour from dye waste samples was determined:

Number	5-day BOD	SOLIDS Total	SOLIDS Susp.	SOLIDS Diss.	pH	Alkalinity as $CaCO_3$	Acidity as $CaCO_3$	Phenol in ppb	Colour Dilution
1	55,000	51,420	22,530	28,890	6.5	-	24	0	5000:1
2	2,500	12,230	1,020	11,210	9.6	2,488		10	50:1
3	1,100	12,000	760	11,240	11.8	5,600		50	5000:1
4	220	4,880	200	4,630	11.3	1,560		0	3000:1
5	2,800	4,500	120	4,380	5.1		372	170	200:1
6	3,000	3,720	136	3,584	7.0	180		30	250:1

DISCUSSION OF RESULTS

The strength and characteristics of textile wastes depend a great deal on the type of fabric and the method of dye application used in processing, and because of this, varying waste strengths will be observed in the batch discharges throughout a day. A representative composite sample of the total plant waste could only be obtained by holding and blending the waste from a day's operation. In regard to sewage treatment plant operation, the important characteristics of wastes from this plant are BOD, total and

Discussion of Results (continued)

suspended solids, pH and the colour dilution factor.

The BOD is defined as the oxygen in parts per million required for the decomposition of the organic matter in the sample by aerobic bacterial action. The samples taken during the course of this survey indicate peak BOD loading as they represent surges of strong waste from batch operations which are characteristic of process operations in the textile industry. The major sources of BOD in these operations are the process chemicals added to the baths and the natural impurities dissolved from the cloth. The highest BOD on a regular voluminous batch discharge was 3,000 parts per million recorded for the scouring waste, while a low of 220 parts per million was recorded for the dye rinse waters. The average BOD of the six samples taken would not be representative of the total plant waste as the rinse waters which make up the single largest flow from a textile mill are not adequately represented.

From the literature it appears that a population equivalent of 20 per 1,000 gallons of waste per day is an accepted average figure or, in other words the biochemical oxygen demand of textile mill waste will average approximately 400 parts per million. Based on the average waste flow of 80,000 gallons, the sewered population equivalent for this plant is 1,600. In other words, the wastes exert a BOD loading equivalent to that of the sanitary sewage from a contributory population of 1,600 people.

Of the suspended solids concentration recorded for samples 2 to 6, only two are above the maximum limit for sanitary sewage. If all wastes

Discussion of Results (continued)

were blended each day, a plant average would be in the range of 3 to 400 parts per million, made up almost entirely of fibres washed lose from the goods during processing. Efficient in-plant screening prior to discharge would considerably reduce this suspended solids load.

pH fluctuation of samples waste discharges ranged from 5.1 to 11.8, and, while highly alkaline wastes may not present a serious corrosion problem, control, through the installation of waste holding facilities, would even out the extremes of pH variation thus facilitating sewage treatment plant operation.

The colour dilution factor of 5,000 to 1 obtained for the sample of spent yarn dye liquor indicates that batch discharges must be well diluted in passage through the sewerage system to lower the colour intensity to unobjectionable limits.

CONCLUSIONS AND RECOMMENDATIONS

The difficulties to be encountered in minimizing waste loading by modifying the textile processes, and the ability of the conventional activated sludge process to successfully treat textile wastes along with sanitary sewage, indicates the desirability of continuing with municipal treatment as is now provided by the primary sewage treatment plant in Galt. The operation of the new treatment plant can be facilitated, however, by in-plant control of wastes to:

1. Prevent "slugs" of dyes or other strong wastes from reaching the

Conclusions and Recommendations (continued)

sewers, by providing waste holding facilities that will allow maximum dilution in the sewers throughout the day.

2. Adjust the pH of caustic or acid wastes to the range 5.5 to 9.5

3. Eliminate small quantities of very strong concentrated wastes, such as the slasher waste, by dumping in suitable disposal sites not connected to the municipal system or by incineration.

Municipality Galt Date of Inspection August, 1961

Re: Dobbie Industries Limited - Newlands Division

Field Inspection by D. P. Caplice Report by D. P. Caplice

Dobbie Industries Limited, head office 104 Water Street North, operates the Newlands plant situated on Ainslie Street South. The Newlands Industries comprise:-

Newlands - Dobbie Limited - texlurilized yarns and stretch yarns
" - Glenoit Limited - hi-pile fabrics and rugs
" - Harding Yarns Limited - worsted yarns
" - and Company Limited - woollen yarns, woven fabrics and knitted fabrics

OPERATING DATA

Personnel Interviewed - Mr. G. Ramsey, Plant Manager
Mr. H. F. Levandushy, Purchasing Agent
Mr. B. Connell, Plant Engineer
Mr. T. Galbraith, Chemist
Mr. S. Hall, Dyer.

Employees - 890

Operating Schedule - 2 shifts, 5 days per week

Water Consumption - 150,000 gpd average (PUC, 1961)
+150,000 gpd estimate (pumped from Mill Creek)

Total 300,000 gpd

Waste Disposal - All industrial wastes from the dye house are discharged through a common sump to the sewer on Chapman Street.

PLANT PROCESSES

The wet processes in this plant are confined to the dye house where piece, package and raw stock dyeing are carried out. In piece dyeing the goods are passed through the dye bath as opposed to the circulation of dye liquor through the material in yarn and raw stock dyeing. For matching shades or for dyeing small quantities of goods, a machine called a jig is used. Briefly, a jig consists of a vat with rollers allowing cloth to pass from one roll down through the dye bath and up onto another roll. This procedure is repeated until the proper shade is obtained.

Customarily the processes which precede and follow the application of dye to the material, ie. scouring, bleaching, rinsing, etc., take place in the same machine. Rinsing usually involves the use of large volumes of water, as a portion continuously goes to waste.

There are seven piece dyeing machines with capacities ranging from a maximum of 2,000 gallons to a minimum of 500 gallons. Further equipment in the dye house includes two package dyers each of 400 gallon capacity, three washing paddles, one dryer and a press-type wringer for dewatering the raw stock.

The plant processing water pumped from Mill Creek is zeolite softened and, as a result, there is a daily discharge of weak brine solution to the creek resulting from the backwashing of the resin during regeneration.

SAMPLING

The following grab samples were taken to ascertain maximum

Sampling (continued)

strengths of liquors discharged to the sewers.

	Pounds of Goods	Vat capacity (gallons)	Volume of Sample (ounces)
1. Bleach liquor	245	415	40
2. Basic dye liquor	201	415	"
3. Basic dye rinse (after 5 minutes)	201	415	"
4. Strong acid dye liquor	-	476	"
5. Strong acid dye rinse (after 5 minutes)			"
6. Weak acid dye liquor	350	1,100	"
7. Rinse (after 5 minutes)	350		"
8. Dispersed dye liquor	70	275	"
9. Dye rinse	70		"
10. Water proofing liquor	220	1,100	"
11. Pre-dye wash liquor	300	1,000	"
12. Boil-off solution	630	1,100	"
13. Sump			
14. Sump			

In addition to the 40 ounce grab samples from specific operations in the dyeing cycle, grabs were obtained from the common in-plant sump three times each day for a week. This sump provides some blending of the total plant waste, and hence these sump grabs can, to a certain extent, be considered representative of the strength of waste going to the sewer.

All samples were returned to the Ontario Water Resources Commission Toronto Laboratory for analyses. Laboratory determinations performed on each sample included:

BOD (Biochemical Oxygen Demand)
Solids, total, suspended and dissolved
pH
Alkalinity or Acidity
Phenol
Ether Solubles

RESULTS

All analyses except pH reported in parts per million unless otherwise indicated

No.	5-day BOD	SOLIDS Total	Susp.	Diss.	pH	Alkalinity	Acidity	Phenol ppb	Ether Sol.	Colour Dilution
1	1,800	4,894	282	4,612	10.6	1,980		30		20:1
2	2,000	6,494	308	6,186	4.0		1,668	40		50:1
3	1,920	3,894	232	3,662	4.2		804	100		25:1
4	65	4,806	90	4,716	2.6		380	300		500:1
5	55	2,560	60	2,500	3.8		36	170		500:1
6	1,350	4,190	360	3,830	4.5		956	15		25:1
7	640	1,744	40	1,704	5.2		148	15		4:1
8	390	870	78	792	9.3	272		120		100:1
9	11	564	70	494	7.5	260		10		10:1
10	3,460	10,444	5,886	4,558	4.7		644	8		2500:1
11	1,380	4,290	1,184	3,106	7.6	232		150		2000:1
12	1,040	2,548	118	2,430	10.0	1,216		12	430	100

The following table shows the results for all the grabs taken from the in-plant sump.

All analyses except pH reported in parts per million unless otherwise indicated

Date	5-day BOD	SOLIDS Total	Susp.	Diss.	pH	Alkalinity as $CaCO_3$	Phenol in ppb	Total Chrome	Ether Sol.	Colour Dilution
1961										
Aug. 31	220	2,820	244	2,576	6.6		30	0.30	30	250:1
Aug. 31	300	1,612	148	1,464	6.3	272	10	0.20	60	100:1
Sept.11	14	542	74	468	8.1	244	10	0.57	53	Turbid
Sept.11	142	782	86	694	7.4	240	15	0.30	130	Turbid
Sept.11	190	1,008	128	880	7.4	228	45	0.21	170	9:1
Sept.12	216	1,646	148	1,498	9.6	350	4	0.22	150	8:1
Sept.12	790	2,292	242	2,050	5.3		10	0.30	240	2:1
Sept.12	205	1,148	170	978	7.3	192	35	0.46	140	12:1
Sept.13	104	1,012	102	910	7.4	254	35	0.30	53	Turbid
Sept.13	142	772	110	662	7.4	252	4	0.30	27	2:1
Sept.13	63	898	82	816	7.1	240	3	0.11	35	4:1
Sept.14	210	1,010	108	902	7.1	242	35	0.06	150	30:1
Sept.14	160	1,554	172	1,382	7.1	238	0	0.16	48	2:1
Sept.14	350	2,532	1,526	1,006	6.8	36	0	0.07	210	30:1
Sept.15	45	582	82	500	7.6	232	0	0.32	53	4:1
Sept.15	220	1,190	196	994	6.8	38	0	0.08	72	20:1
Sept.15	110	1,008	104	904	6.7	44	0	0.13	41	Turbid
AVERAGE	204	1,318	218	1,099	7.2	206	13	0.24	97	36:1

The first two samples in the above chart were taken at 2:00 and 3:00 pm, August 31, 1961, with the remainder being taken at 9:00 am: 12 noon, and 3:00 pm for the successive days shown.

DISCUSSION OF RESULTS

The important characteristics of wastes from this plant are BOD, total and supended solids, pH and colour. BOD loading is from two main sources - the natural impurities that are removed from the fibres and the process chemicals that are added in weaving and processing the cloth.

The BOD is defined as the oxygen in parts per million required for the decomposition of the organic matter in the sample by aerobic bacterial action. The average results for the grab samples taken from the in-plant sump will be considered to be typical of an equalized effluent from this plant. This assumption may be slightly in error, as the retention and mixing given all wastes in the sump is short and haphazard. These in-plant sump grabs run from a high of 790 to 14 parts per million BOD, with the average BOD being 204 parts per million. Of this, 80 percent or more is contributed by process chemical compounds. The highest BOD for the grab samples of the running rinses and dump discharges from the various machines and baths in the mill was 2,400 parts per million for the waterproofing solution which is dumped only once a day.

Based on 0.167 pounds of 5-day BOD percapita per day, and an average flow of 300,000 gpd, the sewered population equivalent using the average BOD of the sump grabs (204 ppm) is 3,664. In other words, the wastes exert a BOD loading equivalent to that of sanitary sewage from a contributory population of 3,664 people.

The suspended solids concentrations recorded for the sump grabs are not excessive, and as some screening is provided for this waste prior to

Discussion of Results (continued)

pumping to the sewer system the concentration should be lower for the final plant effluent.

The pH of the waste on all sump grabs, except one, fell within the recommended range of 5.5 to 9.5 for discharge to sewers. Therefore, corrosion problems should not be encountered.

The low concentrations of chrome, phenol and ether solubles present in the equalized plant waste will be well diluted in the sewerage system and should present no serious treatment problems at the plant.

CONCLUSIONS AND RECOMMENDATIONS

Of the total industrial waste loading in the city, Newland's contributes approximately 46 percent of the BOD, while using about 23 percent of the total water supplied to the industries. To facilitate sewage treatment plant operation by distributing the total daily waste loading, provision of an equalizing tank larger than the present sump, in which the various wastes can be blended prior to discharge, would eliminate shock loading caused by batch dumping. This would ensure that the concentrations of waste components (especially BOD) would be consistently below the maximum recommended limit of 300 parts per million. This would have the additional effect of preventing the discharge of strong dye wastes with their persistent colours, by permitting as much dilution with the total plant waste as possible.

Municipality Galt Date of Inspection August, 1961

Re: Franklin Manufacturing Company Limited

Field Inspection by D. P. Caplice Report by D. P. Caplice

Franklin Manufacturing Company Limited, located at Franklin Boulevard, fabricates freezers and refrigerators from sheet metal, for commercial and domestic use. Prior to fabrication, all sheet metal parts are "bonderized" as protection against corrosion before being spray painted. Spent treating, cleaning, and rinsing solutions result from these operations.

OPERATING DATA

Personnel Interviewed - Mr. J. Sharmer, General Manager
Mr. W. Eveleigh, Bonderite Control Foreman

Employees - 250

Operating Schedule - 5 days per week, 9 hours per day

Water Consumption - 190,000 gpd average - first six months 1961
243,000 gpd peak month - February, 1961

Waste Disposal - All plant wastes are discharged to the municipal sewer on Franklin Boulevard.

PLANT PROCESSES

Bonderizing is a continuous operation carried out in a horse-shoe shaped tunnel divided into five stages. The sheet metal articles, suspended by means of hooks, enter the tunnel on overhead conveyors, and are sprayed or dipped with different solutions at each stage. The stages

Plant Processes (continued)

are independent of one another and each is a closed system.

The first stage involves cleaning of the metallic surfaces with a commercial alkali cleaner (Parco Cleaner). This alkaline solution is rinsed off with running hot water at the second stage. Tank capacities of the first and second stages are both 3,000 gallons.

The third stage involves application of an acid bonderizing material (commercial trade name Bonderite 1000-1000B) followed by a running cold water rinse. Tank capacities of these two stages are respectively 1,440 gallons and 1,120 gallons. The final stage is the spraying of the articles with a chromic phosphoric acid solution (Parcolene), with tank capacity being 1,120 gallons.

The time lapse between entrance and exit of an article for processing is 15 minutes. The solutions in the tanks of the first, third, and fifth stages are sewered when spent. Tanks in stages one, and three are sewered approximately every 80 hours and the tank in stage 5 is similarly disposed of every 40 hours. This schedule can vary with production throughput.

Following bonderizing the sheet metal articles are spray painted in one of two enclosed water-walled spray booths. Each booth is located over a large tank of water (11,000 gallons) containing additives which keep the greater portion of paint particles on the surface of the tank. Circulation of this water down the rear of each booth keeps down the paint fumes. These spray booth tanks are discharged every three weeks. Prior to discharge, the paint floating on the surface is skimmed off and the sludge

Plant Processes (continued)

land dumped.

Other sources of waste result from the regeneration of a caustic ion exchanger water softener, and the periodic discharge (two to three weeks) of 400 gallons of spent caustic solution used as a paint stripper. A small amount of lubricating oil is discharged every three weeks from milling and cutting operations in the sheet metal division. Except for the spent caustic solution, these wastes should present no problem.

SAMPLING

Grab samples of running rinses and tank contents were taken as follows:

	Sample Volume
Bonderizing Operation:-	
1. Alkali cleaner	40 ounces
2. Hot water rinse (continuous)	" "
3. Bonderite solution	" "
4. Cold water rince (continuous)	" "
5. Parcolene solution	" "
6. Spray booth number 1	" "
7. Spray booth number 2	" "
8. Caustic paint stripper solution	" "

All the above samples were shipped to the Ontario Water Resources Commission Toronto Laboratory where the following analyses were carried out:

5-day Biochemical Oxygen Demand (BOD)
Solids - total, suspended and dissolved
pH
Alkalinity or acidity
Chrome

RESULTS

All analyses in parts per million, except pH, unless otherwise stated

Number	5-day BOD	SOLIDS Total	Susp.	Diss.	pH	Alkalinity as $CaCO_3$	Acidity as $CaCO_3$	Chrome as Cr
1	670	17,084	1,130	15,954	9.0	4,580		
2	17	484	60	424	7.1	176		
3	100	27,874	3,268	24,606	5.2		5,040	
4	2.8	476	14	462	7.0	228		
5		556	62	494	2.6		440	400
6	400	4,640	282	4,358	10.0	3,740		
7	230	702	50	652	8.0	320		
8	32,000	107,954	57,804	50,150	9.5	87,500		

SUMMARY OF WASTE LOAD

Process	Waste Volume (gpd)	Method of Discharge	Strength (ppm) BOD	Susp. Solids	Chrome as Cr	Pounds per Day BOD	Susp. Solids	Chrome as Cr
Bonderizing								
#1 tank	3,000	Batch every 2 weeks	670	1,130		20	34	
#2 tank	3,000	continuous	17	60		0.5	1.8	
#3 tank	1,500	Batch every 2 weeks	100	3,268		1.5	49	
#4 tank	3,000	continuous	2.8	14			0.5	
#5 tank	1,200	Batch every week		62	400		0.75	4.8
Paint Spraying								
#1 booth	11,000	Batch every 3 weeks	400	282		44	31	
#2 booth	11,000	Batch every 3 weeks	230	50		25	5.5	
Caustic Stripper	400	Batch every 3 weeks	32,000	57,804		128	228	
TOTAL						219	345	4.8

The above chart shows the constituents in the wastes will vary depending on which tanks are dumped and cleaned.

DISCUSSION AND RECOMMENDATIONS

Analyses of the running rinses at Stages 2 and 4 of the bonderizing process show only minor concentrations of waste components. The important contribution of wastes from the bonderizing operation is the batch dumping of the spent alkali, bonderite, and Parcolene solutions used in Stages 1, 3 and 5 respectively. Chemical pretreatment of these wastes to suitably control the pH and the concentration of metal ions especially the chrome in the Parcolene solution, should be undertaken. Controlled discharge to the sewers after treatment would also permit maximum dilution to be obtained in the sewers throughout the day, and minimize the hydraulic effect of these wastes on the sewerage system.

The batch dumps of spray booth wash waters (Number 6 and 7) are comparable in strength to normal sewage but exhibit a high pH. Efficient skimming of these two tanks with controlled discharge to the sewers would greatly facilitate sewage treatment plant operation.

Disposal to suitable land dumps would eliminate strong wastes, such as the caustic stripper solution, from the plant sewers.

Municipality Galt Date of Inspection August, 1961

Re: Allen-Bradley (Canada) Limited

Field Inspection by H. E. Roberts Report by H. E. Roberts

Allen-Bradley (Canada) Limited, located at 135 Dundas Street, manufactures electrical control equipment such as starters, contactors, relays, etc., as well as completely assembled special control panels for industrial and commercial use. Formed and fabricated steel components used for covers and mounting pieces, as well as control panel enclosure and support members, are given a coat of iron phosphate and sealed to improve the bond between the metal surface and the paint that is applied by spraying after the phosphating and sealing steps. Corrosion resistance is increased by this special phosphate stage. Small metal components as well as certain copper bus conductors are electroplated in the new area devoted to this type of finishing.

OPERATING DATA

Personnel Interviewed - Mr. J. T. Dilly, Plant Superintendent
Mr. W. Gollop, Plating Foreman
Mr. K. Mock, Phosphating Operator

Employees - 200

Operating Schedule - five days per week
nine hours per day

Water Consumption - Total water supplied by Galt PUC
September 1961 - 20,300 gallons per day

Operating Data (continued)

Approximate total water breakdown:-

Plating	-	14,000 gallons per day
Phosphating	-	2,500 gallons per day
Sanitary	-	3,000 gallons per day
Cooling and Boiler make-up	-	800 gallons per day

Waste Disposal - Sanitary wastes and cooling waters are discharged to the Galt sanitary sewer system
Rinse wastes from the phosphating line are discharged to the storm sewer
Rinse wastes from the plating operations are discharged to a ponding area on the company's property.

PLANT PROCESSES

The manufacturing and the assembly of the products produced by this company involve operations that produce no industrial waste with the exception, of course, of the plating and phosphating stages.

Phosphating - By means of an overhead monorail crane and an operator the metal work to be surface treated is lowered in a mesh basket into five connective process tanks. The sequence followed is (a) an emulsion cleaner, (b) a hot water rinse, (c) an iron phosphate solution, (d) a cold water rinse, and (e) a sealing solution that contains a very small amount of chromic acid. Following the sealing rinse, the parts are air dried and sprayed with paint electrostatically. Production ranges from 20 to 50 baskets daily depending upon the size of the work being treated and the production demand.

Electroplating - Allen-Bradley have only recently introduced

Plant Processes (continued)

plating into their plant production facilities, March 1961. This production has not reached its full capacity as the plating process is now only in operation three days per week. Electro deposited coatings of silver, copper or cadmium are applied to the work being processed. A chromate dip is utilized to give a lustre finish to certain cadmium plated items. Standard associated cleaning and pickling solutions as well as a stripper solution are present and constitute an integral part of the electro finishing procedure. Running water rinses used to wash the various above-mentioned plating, pickling, and cleaning solutions from the work being processed are discharged to a common sump and hence to the ponding area on the company's property.

SAMPLING

A grab sample at the outfall from the plating area was obtained and forwarded to the Ontario Water Resources Commission Toronto Laboratory where an analysis was carried out. The results disclosed the following:

Cadmium as Ca	Copper as Cu	Cyanide as HCN	Total Chromium as Cr	Hexavalent Chrome as Cr
Interference	0.4	2.4	0.12	0.0

DISCUSSION AND RECOMMENDATIONS

Phosphating - Running rinses in the phosphating operation, stages (b) and (d) are known to contain only minor concentrations of waste components

Discussion and Recommendations (continued)

and can therefore be considered suitable for discharge to either storm or sanitary sewer systems. The emulsion cleaner (a), the phosphating solution (c), and the sealing solution (e), constitute a waste problem when these are discarded periodically and replaced by new equivalent solutions. These spent solutions should be either (a) disposed completely in their spent condition on a suitable land dump area - this method is preferred as it completely eliminates strong wastes from entering the receiving stream, or (b) chemically pretreated to control the pH and the concentration of metal ions present - the resultant treated solution should be discharged at a controlled rate to obtain maximum dilution in the sewer and any resulting sludge present,due to the formation of insoluble compounds,should be land dumped.

Electroplating - Small portions of plating and other associated solutions (ie, cleaner and pickle) are dragged out on the work being processed. These small amounts of corrosive or toxic liquid are subsequently rinsed off of the parts in running rinse waters which are allowed to flow to a common sump in the plating room area. From this sump the contaminated rinse water flows by gravity to an open ditch and ultimately arrives at a depressed area where ponding results. This area is located on the company's property. Plating solutions are never discharged, however, the cleaner, pickle, cyanide dip, chromate bright dip, and the strip tank are periodically discarded, the frequency of dump depending mainly on the condition of the

Discussion and Recommendations (continued)

parts being plated.

These spent solutions must be disposed of in the manner outlined under (a) or (b), the (a) method being the one especially preferred.

The running rinses, contaminated with the carry-over of the various process solutions, are presently allowed to flow into an open ditch and ultimately enter a ponding area on the company's property. It is suggested that if the present method of dealing with these contaminated rinses is continued, that the flow now present in the open ditch be directed through corrosive resistant tiles to the ponding area, and further that the ponding area be completely surrounded by a fence at least eight feet high.

Municipality Galt Date of Inspection August 1961

Re: Dominion Tack and Nail Company Limited

Field Inspection by H. E. Roberts Report by H. E. Roberts

The Dominion Tack and Nail Company Limited, located at 431 Dundas Street, manufactures tacks and nails. With the exception of the cleaning and electroplating operations, the manufacturing procedures are such that no industrial wastes are encountered.

OPERATING DATA

Personnel Interviewed - Mr. F. W. Landreth, President and General Manager

Employees - 56

Operating Schedule - 5 days per week
9 hours per day

Water Consumption - 15,300 gpd - water supplied by Galt PUC

breakdown of water consumption:-

sanitary	-	1,300 gallons per day
cooling	-	7,000 gallons per day
plating	-	4,200 gallons per day
washing	-	2,800 gallons per day
T o t a l	-	15,300 gallons per day

Waste Disposal - Sanitary wastes are discharged to the Galt sanitary sewage system. Cooling and washing wastes are discharged to the Galt storm sewer system. Plating wastes are discharged to underground settling basins which incorporate a weeping tile system for discharging the solids-free effluent into the ground. This underground system is on the company's property.

PLANT PROCESSES

In as much as industrial wastes from this plant originate only from the washing and plating operations, the balance of the manufacturing steps need not be outlined in this report.

A portion of the plant's production requires that special metallic coating be applied to the parts for decorative or corrosion preventive reasons. These parts are cleaned in alkali solutions contained in rotating barrels, rinsed in running cold water, placed into horizontal plating barrels and electroplated. Coatings of brass, tin, nickel or copper can be so applied.

The plating solutions are never discarded but are filtered and chemically treated to maintain them at an optimum workable level. Cleaning solutions become contaminated with oil, dirt and metal ions and are frequently dumped. These are replaced with similar fresh solution. "Dragout" is the term applied to that portion of the process solution that adheres to the work being plated or treated when the work is removed from the process solution. This dragout is washed or rinsed from the work in tanks which are known as rinse tanks. The fresh water that flows continually into these rinse tanks becomes contaminated and is allowed to overflow at the same rate that the water supply is being fed. These large volumes of rinse water constitute an industrial waste problem when they enter a sewer or watercourse.

SAMPLING

A 40 ounce composite sample of running rinse water was collected

Sampling (continued)

at the most north-west corner of the company's property, at the point where the school yard fence and the company's fence meet adjacent to the railway track. The sample was forwarded to the Ontario Water Resources Commission Toronto Laboratory where an analysis was carried out. The results disclosed the following:

Sample Number T-1106 - reported in parts per million

Total Solids	Suspended Solids	Tin as Sn	Nickel as Ni	Copper as Cu	Cyanide as HCN	Zinc as Zn
1,490	74	Inter- ference	6.8	39.0	56.0	0.1

DISCUSSION AND RECOMMENDATIONS

The analytical results indicate that copper and cyanide are present, in the effluent running from the company's property, at levels considered extremely dangerous. This is especially so due to the proximity of the school yard playground. Action must be taken immediately by the Dominion Tack and Nail Company to inspect and repair the underground plating rinse holding basins and associated weeping tile system to assure that all of the contaminated plating rinse waters and periodic spent solution dumps are maintained below ground and on company property. If the situation cannot be rectified, ie. if the ground has become so saturated by previous flows that no further moisture can be contained in the ground of the allotted area, steps will have to be taken to chemically pretreat the wastes and

Discussion and Recommendations (continued)

divert these to the sanitary or storm sewer. Limits or degrees of treatment required for these wastes can be obtained from the engineering department of the city of Galt or from the Ontario Water Resources Commission.

Municipality Galt Date of Inspection August, 1961

Re: Electronic Coatings Limited

Field Inspection by H. E. Roberts Report by H. E. Roberts

Electronic Coatings Limited, a small, relatively new subsidiary of the Ray Electric Company, is located in a ground floor area of the Riverside Yarns building on Melville Street South. The company electroplates coatings of nickel and chromium on nuts, bolts, washers and screws for the automotive trade.

OPERATING DATA

Personnel Interviewed - Mr. W. Ray, President and Owner of the Ray Electric Company, Galt

Employees - 2 men operate the plating room

Operating Schedule - 5 days per week
9 hours per day

Water Consumption - Water is purchased from the Riverside Yarns Company
Average consumption by Electronic Coatings 2,500 gallons per day

Waste Disposal - The plating rinse waters flows by gravity to a common sump in the plating room floor then through pipe to the bank of the Grand River and ultimately into the river.

PLANT PROCESSES

Finished nuts, bolts, washers and screws are received from manufacturers of these components, (eg. The Steel Company of Canada, Morrow

Plant Processes (continued)

Screw and Nut Company Limited). These small parts are pickled in an acid solution contained in a tumbling barrel, plated with a coating of nickel in two small plating barrels and finally given a coating of chromium in an automatic chrome plating unit. Production varies between 300 to 600 pounds daily. No plating solutions or other solutions used by this company contain any cyanide.

SAMPLING

A composite sample of the flowing rinse waters was obtained at the sewer outfall from the plating area. This was forwarded to the Ontario Water Resources Commission Toronto Laboratory where an analysis was carried out. The results disclosed the following:

Sample Number T-1107 - analysis reported in parts per million

Total Solids	Suspended Solids	Nickel as Ni	Total Chrome as Cr	Hexavalent Chrome as Cr
564	58	0	6.4	6.4

DISCUSSION AND RECOMMENDATIONS

Metal ions of chromium are present in the plating room effluent in an amount that exceeds the limits prescribed as acceptable for discharge to open watercourses. A simple programme should be initiated to reduce the amount of chrome dragout from reaching the river. The addition

Discussion and Recommendations (continued)

of one or two dragout tanks following the chrome plating unit will substantially reduce the presence of chromium in this plant's effluent. The addition of proprietary wetting agents to these dragout tanks will increase their effectiveness in removing chromium plating solution from the work being processed. Connection into the Galt sanitary sewerage system should then be considered.

Municipality Galt Date of Inspection August, 1961

Re: Galt Brass Company Limited

Field Inspection by H. E. Roberts Report by H. E. Roberts

Galt Brass Company Limited, located at 471 Dundas Street, manufactures a wide variety of brass plumbing fittings. A brass foundry, an integral part of this concern, produces all of the brass cast components that are machined, threaded, plated, etc., as steps in the production of the finished items. Industrial wastes discharged from the Galt Brass Company all originate in the electroplating operations that are carried on in the plating department.

OPERATING DATA

Personnel Interviewed - Mr. H. A. Saunders, President
Mr. J. J. McCartney, First Vice President and Managing Director
Mr. F. W. Wobschall, Plant Foreman
Mr. J. Perry, Plating Foreman

Employees - 200

Operating Schedule - 5 days per week, 9 hours per day

Water Consumption - 74,000 gallons per day - all supplied by Galt PUC

Approximate breakdown of water consumption -

sanitary -	4,000 gallons per day
heating, cooling & miscellaneous -	10,000 gallons per day
plating -	60,000 gallons per day
TOTAL	74,000 gallons per day

Operating Data (continued)

Waste Disposal - Sanitary - to Galt sanitary sewer
Balance - to Galt storm sewer

PLANT PROCESSES

The foundry, located immediately behind the main office and manufacturing plant, produces the brass castings used in the finished items marketed by this company. The various functions carried out in this area, sand moulding, core moulding and casting, etc., require virtually no water and hence no industrial wastes of any significance were encountered there.

The general manufacturing steps are confined to machining the brass castings and assembly of the finished products. Cutting oils and coolants used on the various production machines, ie. lathes, millers, shapers, drills, boring mills, etc., are filtered and reused or land dumped on the company's property when these are contaminated to a point beyond which they cannot be recovered.

A very large proportion of the parts that go into the finished products, are given electroplated coatings of first copper, second nickel, and finally a thin coating of chrome. This metal finishing operation produces a number of sources from which industrial wastes stem. The actual solution from which the metal is plated is never discarded but is filtered and treated chemically to maintain the solution at a maximum level of efficiency. Acid pickle, alkali cleaner and strip solutions are expendable and are discarded or dumped periodically and are replaced with

Plant Processes (continued)

new equivalent solutions.

"Dragout" is that portion of the process solution, be it the actual plating bath or an expendable solution that is carried over on the work or part being processed as it leaves that particular solution. This so-called "dragout" is immediately rinsed off the work by placing the work into a rinse tank into which water is continually flowing and from which water is continually overflowing at a rate equal to the input. These effluents from the various rinse tanks are thus contaminated and constitute a large volume of slightly polluted water that is allowed to flow directly to the storm sewer from floor drains located in the plating room.

SAMPLING

A composite sample of the total running rinse waters was taken at a manhole located in the brass rod storage shed immediately adjacent to the north wall of the plating area. The sample was forwarded to the Ontario Water Resources Commission Toronto Laboratory where the following analytical results were established.

Sample Number T-1108 - results shown in parts per million

Total Solids	Suspended Solids	Copper as Cu	Total Chrome as Cr	Hexavalent Chrome as Cr	Nickel as Ni	Cyanide as HCN
442	24	1.6	10.0	7.0	0	2.2

DISCUSSION AND RECOMMENDATIONS

The results of the analysis made on the composite sample of discharged rinse water indicate the presence of chromium in an amount above the recommended limit for discharge to either storm or sanitary sewer systems. It is recommended that cyanide be destroyed or otherwise completely eliminated from any effluent. To reduce the amounts of these two toxic ions in the rinse water effluent, it is suggested that a second dragout tank be placed in the plating line following the existing chrome dragout and that a dragout tank be located immediately following the copper plating bath.

Air or mechanical agitation should be introduced into both of the chrome dragout tanks to assure that the plating solution is washed completely from the work before the work enters the running rinse tank following the second dragout tank. Agitation will also be required for the dragout tank following the copper cyanide plating bath. Periodically the contents of these dragout tanks will have to be returned to their respective plating tanks. The schedule for return can be established only by trial and error under actual operating conditions.

Expendable or spent solutions that are periodically dumped must be disposed of either by (a) - taking the complete spent solution to a suitable land dump area - this method of disposal is preferred as it completely eliminates strong wastes from entering the sewer, of by (b) - chemically pretreating to control the pH, the concentration of metal and

Discussion and Recommendations (continued)

toxic ions present and the suspended solids content - the resultant treated solution should be discharged at a controlled rate to obtain maximum dilution in the sewer and any resulting sludge present due to the formation of insoluble compounds must be land dumped.

Municipality Galt Date of Inspection August, 1961

Re: Rauscher Plating Company Limited

Field Inspection by H. E. Roberts Report by H. E. Roberts

Rauscher Plating Company Limited, located at 190 Water Street, is a job plating shop that applies electroplated protective coatings to steel and alloy finished shapes. The actual work processed is received in the completed machined or cast state and requires only cleaning, electroplating, and occasionally buffing. These latter operations are those accomplished by this metal finishing concern. Industrial wastes are discharged as a result of these process steps.

OPERATING DATA

Personnel Interviewed - Mr. L. Rauscher
Mr. F. Ehrentraut

Employees - 6 to 8

Operating Schedule - 5 days per week, 9 hours per day

Water Consumption - 16,250 gallons per day - all supplied by Galt PUC

Waste Disposal - Sanitary - 250 gallons per day to sanitary system
Plating - 16,000 gallons per day to Grand River

PLANT PROCESSES

Finished ferrous and non-ferrous parts, that require an

Plant Processes (continued)

electroplated decorative or protective coating, are received and processed in one or more of the plating solutions available at this company. Prior to the actual electroplating, the pieces of work are thoroughly cleaned in an alkali base solution and usually further cleaned by immersion into an acid etch or pickle solution. Following each of these cleaning dips, the work is rinsed by introducing each part into tanks that are continually being supplied with clean running water which is allowed to overflow and to eventually reach the Grand River. Similar rinses are employed immediately following the actual plating solutions. The contamination picked up from the work being processed by these flowing wastes constitutes an industrial waste problem. Plating solutions are costly and are never dumped or discarded. These baths are continually treated chemically and mechanically filtered to maintain them at a maximum operating efficiency. Alkali cleaner, acid pickle and chromate "brite dip" solutions are expendable and are dumped periodically when their useful life has been exceeded. These dumps of spent concentrated solutions also present an industrial waste problem.

SAMPLING

Composite samples of the total running rinse waters were taken at the north and south outfalls from the company at the point of entry into the Grand River. These samples were forwarded to the Ontario Water

Sampling (continued)

Resources Commission Toronto Laboratory where the following analytical results were established:

Sample Number T-1103) T-1104) results shown in parts per million

	Total Solids	Susp. Solids	Zinc as Zn	Copper as Cu	Cadmium as Cd	Nickel as Ni	Cyanide as HCN	Chrome as Cr Total	Chrome as Cr Hexavalent
North	748	82	0.2	1.4	<1.0	0	3.0	0.18	0
South	706	66	2.1	1.1	<1.0	0	15.0	0.07	0

DISCUSSION AND RECOMMENDATIONS

In as much as the samples taken were composite and taken over a six hour period, the amounts of chemicals indicated by the results tabulated above will vary greatly from day to day and week by week. These fluctuations in concentrations are accountable to the fact that the type of finish required to be plated onto the work being processed changes to meet the specifications requested for that particular type of finish.

The analytical results indicate cyanide exceeding the recommended minimum level established for discharge to an open stream or river. To reduce the amounts of this toxic ion in the rinse water effluent, it is suggested that a reclaim or dragout tank be placed in the plating cycles immediately after each cyanide bearing plating bath. Air or mechanical agitation should be supplied to insure that the maximum amount of toxic plating solution possible is rinsed from the processed work and contained

Discussion and Recommendations (continued)

in the dragout tank. A schedule should be arranged to periodically treat or return to the plating bath the cyanide contaminated liquid that will build up in these reclaim or dragout tanks. A similar set-up should be arranged after each of the various other plating solutions. Care taken in racking the work and the allowance for good drainage over the respective plating solutions will cut down appreciably the amount of contamination that might possibly reach the river.

Spent or expendable solutions that are periodically dumped must be taken to a suitable land dump area. pH of the total running rinse effluent should be maintained between the limits of 5.5 and 8.6.

Municipality Galt Date of Inspection August, 1961

Re: Royal Metal Manufacturing Company Limited

Field Inspection by H. E. Roberts Report by H. E. Roberts

Royal Metal Manufacturing Company Limited, located on Hespeler Road at the junction of number 8 Highway, manufactures various types of metal furniture including office, school and hospital types.

OPERATING DATA

Personnel Interviewed - Mr. R. A. McLean, General Manager
Mr. D. E. Murray, Purchasing Agent
Mr. R. Dowling, Boiler Engineer
Mr. R. Cameron, Plating Foreman
Mr. R. Steel, Assistant Plating Foreman

Employees - 177

Operating Schedule - 5 days per week, 9 hours per day

Water Consumption - Total 66,300 gallons per day - supplied by Galt PUC

Approximate breakdown of total water consumption -

sanitary - 4,300 gallons per day
industrial - 62,000 gallons per day

Total - 66,300 gallons per day

Waste Disposal - Sanitary wastes are discharged to the Galt sanitary sewer system
All other water is discharged to the Galt storm sewer system

PLANT PROCESSES

Metal is braked and formed into legs, arms and shapes to be used as components of finished office, home and general furniture. These metal pieces are given a protective coating prior to being incorporated into the finished item of furniture. Protective or decorative coatings of either paint or electro-deposited metal are applied, with each type of finish giving rise to industrial wastes. Large amounts of plywood and plastic or fabric material are used as inserts and covers respectively for seats, backs, arms, etc. of the various pieces of furniture manufactured.

The manufacture and assembly of the products produced by this company involve only operations that produce no industrial wastes with the exception of the plating, phosphating and painting phases.

Spray Painting - Spray painting is carried out in three water-washed spray booths by means of standard type compressed air operated spray guns. Water in each booth is constantly recirculated and cascaded down a wall behind the work being sprayed. The paint spray that does not come into contact with the work being coated is carried by the cascading water and is subsequently deposited in the spray booth water holding reservoir. A proprietary compound, Oakite 45, is present in the circulating water system and this substance keeps the greater portion of the paint particles on the surface of the reservoir from which they are periodically skimmed and land dumped. Once weekly the virutally paint-free spray wash waters

Plant Processes (continued)

are discharged to the storm sewer and these waste waters are then replaced with fresh supplies. Spray booth reservoir capacities are as follows:

One	-	300 gallons
Two	-	600 gallons each

Phosphating -

To obtain a pre-paint metal surface protection and to obtain a maximum bond between metal and paint, a three-stage spray-type phosphating machine is utilized. The sequence followed is (a) an alkaline spray cleaner, (b) water rinse, (c) iron phosphate spray, (d) water rinse, and (e) a spray of a sealing solution that contains a small amount of chromic acid. Following the phosphating operation the parts are air dried and spray painted.

Electroplating - Components that require an electro-deposited coating of chrome, nickel, brass, copper or zinc, are processed in the plating department. The parts are cleaned in alkaline and acid solutions and plated in electroplating baths where one or more metal finishes can be applied. The actual plating baths are usually quite expensive and are never discarded, however, the cleaners, acid pickles, paint strippers and plate strippers are periodically discarded and dumped. Occasionally a strike tank is also dumped. All of these concentrated expendable solutions present a very severe shock load when they are discharged to the sewer.

Thorough rinsing in water is a very important phase of all

Plant Processes (continued)

electroplating operations. After the item being plated, pickled or cleaned is removed from the particular solution, it is placed in a running water rinse to remove any of the solution that may adhere to the part. In this manner, the flowing rinse that follows each process tank becomes contaminated with the solution that has been rinsed off the part. These contaminated rinses flow continually during the plating operation and are allowed to overflow to a common sump in the plating area and hence to the storm sewer.

SAMPLING

A composite sample from the storm sewer manhole north of the main office wall was obtained and forwarded to the Ontario Water Resources Commission Toronto Laboratory where the following analyses were carried out:

Sample Number T-1116 - reported in parts per million

Total Solids	Suspended Solids	Dissolved Solids	Nickel as Ni	Total Chrome as Cr	Hexavalent Chrome as Cr	Cyanide as HCN
2,600	360	2,240	0	4.4	3.3	0.8

DISCUSSION AND RECOMMENDATIONS

Phosphating - Running rinses in the phosphating operation,

Discussion and Recommendations (continued)

stages (b) and (d) under phosphating above, are known to contain only minor concentrations of waste components and can be considered inoffensive insofar as their acceptance to either storm or sanitary sewer systems is concerned. The alkali cleaner (a) the phosphating solution (c) and the sealing solution constitute a waste problem when these are discarded periodically and replaced by new equivalent solutions. The dumping schedule for these spent solutions, is approximately once every two months. These spent solutions should be either, (a) disposed of completely in their spent condition on a suitable land dump area - this method is preferred as it completely eliminates strong wastes from entering the receiving sewer, or (b) chemically pretreated to control the pH and the concentration of metal or toxic ions present - the resultant treated solution should be discharged at a controlled rate to obtain maximum dilution in the sanitary sewer. Any resulting sludge present due to the formation of insoluble compounds after chemical pretreatment must be land dumped. The capacity of each stage of the phosphating machine is 2,400 U.S. Gallons.

Electroplating - Spent plating process solutions, those that are no longer suitable for further use (described under Electroplating above) must be disposed of in the manner outlined under (a) or (b) for Phosphating, the (a) method being preferred.

Results of the analyses made on the composite sample of collected plating running rinse and other process water indicate the presence of chrome and cyanide at undesirable levels. In order to reduce the

Discussion and Recommendations (continued)

contamination present to within the maximum limits for discharge to sanitary sewers, it is suggested that air or mechanically agitated reclaim tanks be installed immediately following each of the cyanide-type plating or strike solutions, as well as after the chrome plating bath. Additional dwell time over each plating bath should be considered so that a maximum of drainage from the work to the bath can be realized before the work is introduced to the following rinse or dragout tank.

Spray Painting - The batch dumps of spray booth wash waters should be controlled at a slow rate to the sewer to prevent a slug of solution from entering the storm system. It has been found that these relatively paint-free waters are comparable in strength to normal sewage but exhibit a high pH. A controlled discharge rate of dumping can equalize the high pH factor by dilution with other industrial wastes being discharged from the plant.

Miscellaneous - A 1,200 Gallon capacity emulsion cleaner, that is used infrequently, is dumped approximately once every two years. When the necessity for dumping this spent solution arises, it should be trucked away to a suitable land dump area. It should not be allowed to enter the storm or sanitary sewer.

Municipality Galt Date of Inspection August, 1961

Re: Dairy Industry in Galt

Two of the dairies operating in Galt may be classified as bottling works. Raw milk and cream are received in cans with the process operations consisting of can dumping, sampling, weighing, clarification, preheating, filtration, pasteurizing, cooling and bottling of milk and cream. Other operations include the washing of bottles, cases, cans, vats, apparatus for clarifying, heating, pasteurizing and cooling, and floors.

The sources of waste in the above operations are as follows:

(a) whole milk left in cans and equipment;
(b) process operations;
(c) cooling waters;
(d) sanitary waste.

The volume of waste exclusive of cooling water averages about 250 gallons per 1,000 pounds of milk intake daily for bottling works.

In addition to this waste made up of various dilutions of whole milk, accidental or intentional spills, drippings allowed to waste by inefficient processing equipment methods, washes containing alkali or other chemicals used to remove milk from cans, bottles, etc., are discharged from time to time.

Based on an average loss of one percent of the milk intake, the effect of discharging milk from incomplete can dumping alone amounts to an

equivalent of six persons per 1,000 pounds of milk received on an equivalent sewered population BOD basis.

From the analyses of many samples from a variety of dairy operations, the ratio of 5-day BOD to suspended solids was found to average 1:52. Applying this factor to the BOD sewered-population equivalents and a correction for per capita daily oxygen requirements based on 0.167 pounds 5-day BOD and 0.2 pounds suspended solids per person, respectively, gives a population equivalent on a suspended solids basis for bottling works of 3.

Two other types of dairy operations are carried out in Galt with one going under the classification of a general dairy, while the other is a straight creamery.

The products manufactured at the general dairy include pasteurized bottled milk, cottage cheese, buttermilk, ice-cream and chocolate skim milk. Process wastes consist mainly of equipment washes with the cheese operation possibly contributing some whey.

In the creamery operation, whole milk, sour cream, and sweet cream are processed into butter and other products. The whole milk is separated for its cream content and the by-product skim milk is disposed of variously to condensing or dry-milk plants.

In the above four milk processing industries, the largest portion of waste flow from each consists of cooling water used in condensers and pasteurizing vats. The can, bottle, and equipment washing wastes are small and intermittent but concentrated. The quantity of these strong wastes will vary widely with losses from all operations ranging from 0.1

to as high as six percent, averaging about one percent.

Therefore, the main recommendation in regard to operation of milk processing plants discharging wastes to a municipal sewerage system is that at no time should by-products such as excess skim milk, whey, and buttermilk, be discharged contrary to approved methods to the sewers.

The greatest difficulty to be encountered in treating such dairy wastes in a municipal sewage treatment plant usually results from shock loading caused by accidental or emergency dumping of whole or skim milk to the sewers. The extreme loading on the sewage plant that usually follows a large-scale loss or discharge usually renders the sewage septic and completely interrupts the treatment process. Means for preventing such batch discharges or for intercepting them before they reach the sewer should be provided if the sewage treatment plant is to operate continuously as intended.

CHART SUMMERY OF VOLUME AND STRENGTH OF MILK PRODUCT WASTES

Type of Plant	5-day BOD (ppm)	Sewered-Population Equivalent per 1000 lbs. of milk received: BOD	Susp. Solids	Gallons of Waste (1) per 1000 lbs. of milk received	Total milk solids in waste (ppm)
Bottling works		6	3	250	600
General dairy	570	10	5	340	
Creamery	110	6	3	110	1,500

(1) exclusive of cooling water

GALT DAIRY

OPERATING DATA-

Type of plant - Bottling works

Mailing Address - 44 Chalmers Street North (office)

Personnel Interviewed - Mr. F. Douglas, General Manager
Mrs. Miller, Bookkeeper

Employees - 13

Operating Schedule - 9 hours per day, 5 days per week

Water Consumption - 12,000 average gallons per day (PUC 1961)
15,000 maximum gallons per day (PUC 1961)

Waste Disposal - All wastes are discharged directly to the sanitary sewer

Pounds of milk processed per month - 162,274

Pounds of milk processed per day - 7,370

All unsold milk is sold to the creamery in Galt.

CEDAR HILL DAIRY

OPERATING DATA -

Type of Plant - bottling works

Address - Cedar Street, Galt

Personnel Interviewed - Mr. Bennett Roseburgh, Manager

Employees - 25

Operating Schedule - 9 hours per day, 5 days per week

Water Consumption - 32,480 average gallons per day (PUC 1961)

Waste Disposal - All wastes are discharged directly to the city sewer on Cedar Street.

Pounds of raw milk processed per month - 290,000 average

Pounds of raw milk processed per day - 13,000

DIXON DAIRY

OPERATING DATA -

Type of Plant - General dairy

Address - 1 St. Andrews Street

Personnel Interviewed - Mr. J. D. Sutherland, Plant Manager

Employees - 25

Operating Schedule - 9 hours per day, 5 days per week

Water Consumption - 42,000 average gallons per day (PUC 1961) plus some private from well for boiler

Waste Disposal - All wastes are discharged directly through floor drains to the city sewer on Cedar Street

Pounds of raw milk processed per month - 354,313 (August, 1961)

Pounds of raw milk processed per day - 16,000

Product Breakdown -

15,600 lbs. per month	chocolate skim milk drink
2,140 lbs. per month	buttermilk
7,000 lbs. per month	ice cream
1,264 lbs. per month	cheese
315 lbs. per month	cream
325,000 lbs. per month	bottled milk

Remarks - No can washing operation.
- Pasteurization unit is of the high temperature short time (HTST) automatic type.

VALLEY VIEW CREAMERY LIMITED

OPERATING DATA -

Type of Plant - Creamery

Address - 15-17 Chalmers Street South

Personnel Interviewed - Mrs. Laura Serrie, Manager

Employees - 9

Operating Schedule - 9 hours per day, 6½ days per week

Water Consumption - 38,000 average gallons per day (PUC 1961)
45,000 maximum gallons per day (PUC 1961)

Pounds of raw milk processed per month - 1,247,000 (June 1961)

Pounds of raw milk processed per day - 56,000

Product Breakdown - 60,000 pounds per month of butter
900,000 pounds per month of skim milk
plus some as cream and animal feed

Waste Disposal - All wastes are discharged from plant through floor drains to the city sewer

Remarks - All raw milk received in cans
- All skim milk before shipment is pasteurized.

SUMMARY OF EXPECTED WASTE LOADS FROM DAIRY INDUSTRY *

Name of Dairy	Type of Plant	Pounds of Raw milk Processed per day	Gallons of Waste Expected (1)	Sewered-Population Equivalent BOD	Sewered-Population Equivalent Susp. Solids	Number of Employees	Volume of Sanitary Waste-gpd (2)	Volume of Cooling Waste-gpd	Total Water Consumption gpd
Cedar Hill Dairy	Bottling works	13,000	3,250	78	39	25	500	28,730	32,480
Galt Dairy	Bottling works	7,370	1,875	45	22	13	260	12,865	15,000
Dixon Dairy	General dairy	16,000	5,440	160	80	25	500	36,060	42,000
Valley View Creamery Limited	Creamery	56,000	6,160	336	168	9	180	31,660	38,000

* Based on figures from literature

(1) Exclusive of cooling waters and sanitary waste

(2) 20 gallons per capita per day

Report by:

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Director of Laboratories

Supervised by:

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Approved by:

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General Manager

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